Pontificia universidad javeriana

Bases de Datos 2022.10

Online Car Rental System

The project is an Online Car Rental (OCR) System. Your company's requirements engineering team has met with the customer («House of Cars») and has compiled an Initial Requirements Document and several use cases. The analysis team did not have time to create a domain model, so this has to be part of your design effort.

Background

«House of Cars» is a company that acts as intermediary between owners who wish to put their cars on rental and customers who wish to rent a car for a fixed period of time.

«House of Cars» currently employs about 2000 employees in 100 subsidiary agencies. Each subsidiary proposes a list of cars for rent. In order to list a car for rental with «House of Cars», a car owner contacts the subsidiary agency nearest to the car to be put on rental. The owner provides details on the car and agrees with the agency manager on a monthly rental fee.

Right after a car is recorded, «House of Cars» takes over and provides a set of services aiming at ensuring the car is rented for the best return possible to the owner and, of course, to the company. Among these services, «House of Cars» meets and evaluates candidate renter, organizes visits to the car, advertises when needed in newspapers, and negotiate the lease. «Houses of Cars» assumes the responsibility of rented cars including rent collection.

A person interested in the rental of a car must initially register as a customer at an agency. An interview is normally conducted before a person is accepted as customer. Personal information and preferences regarding desired car are sought during that interview. Registered customers receive a weekly report listing cars available for rental. «House of Cars» organizes customers' visitations to cars proposed to them.

When a customer decides to rent a car, an employee prepares a lease for a duration pre-determined with the customer. At the end of the rent, a customer has the possibility to ask that a new rent be establish to prolong the expired one.

Objective

The objective of the project is to develop an online system to help «Houses of Cars» interact quickly and efficiently with its Customers.

Use Case Diagram

Use-Case Specification: Add Car

- Preconditions:

    - Owner is logged in the OCR website.
- Postconditions:
    - If successful, information about the new car was uploaded and stored.
    - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when Owner wants to add a car to the OCR system.

1. OCR asks Owner to fill out the add car form:
    - 5 photo files (maximum size is 1MB and file format is jpg)
    - License plate
    - Type of the car
    - location (from the list of available locations)

Para este location se debe tener registro del país, departamento y municipio. Location corresponde al barrio.

    - rent
    - identifier of the owner
2. Owner fills out the add car form in any order and submits the add request.
3. OCR uploads the photos and store information about the car. An identifier is associated to each new inserted car.
4. OCR informs Owner that the information about the car was successfully stored.
5. The use case terminates.

Alternate Flows

A1. Missing Information

Occurs at step 3 of the basic flow if not all of required information was correctly entered.

1. OCR displays the filled add car form, indicating which car information was not entered correctly.
2. The use case resumes with step 2 of the basic flow.

A2. Duplicate Filename

Occurs at step 3 of the basic flow if the entered license plate already exists in the OCR system.

1. The use case resumes with step 3 of the basic flow.

Special Requirements

OCR must handle ten concurrent car add operations. Adding a car should not take longer than 10 seconds.

Use-Case Specification: Browse Cars By Location

- Preconditions:
  - Visitor is at the OCR website.
- Postconditions:
  - If successful, cars matching the actor's input were displayed.
  - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when the Visitor wants to browse cars photos by location.

1. OCR asks Visitor to enter one location (from a list of available locations).
2. Visitor selects a location and submits a browse request.
3. OCRUc View Cars.
4. The use case terminates.

Alternate Flows

A1. No Location Available

Occurs at step 1 of the basic flow if no Location is available.

1. OCR informs the Customer that no location is available.
2. The use case terminates.

Special Requirements

OCR must handle ten concurrent instances of photo browsing. Showing of photos should not take longer than 10 seconds.

Use-Case Specification: Create Account

- Preconditions:
  - The owner’s file or customer’s file has already been manually reviewed.
  - Agent is logged in OCR website.
- Postconditions:
  - If successful, a new account was added to the OCR system.
  - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when Agent wants to add an account to the OCR.

1. OCR asks Agent to fill out the account form.
   - username (can only contain letters and numbers)

    - password
    - given name
    - last name
    - email address (must contain one "@" character)
    - type of account (one out of "Customer" and "Owner")
    - If the type of account is Customer, the maximum amount of rent that the customer can offer.
2. Agent obtains the information from a User (Customer or Owner) and fills out the account form in any order and submits the create request.
3. OCR sets the account creation date to the local server date, the account creation time to the local server time, and store it.
4. OCR displays a confirmation page informing Agent that the account has been created successfully.
5. An identifier is related to the User to whom the account was created.
6. The use case terminates.

Alternate Flows

A1. Missing Information

Occurs at step 3 of the basic flow if not all of the required customer or owner information was entered correctly.

1. OCR displays the filled account form, indicating which information was not entered correctly.
2. The use case resumes with step 2 of the basic flow.

A2. Duplicate Username

Occurs at step 3 of the basic flow if the entered username already exists in the OCR system.

1. OCR displays the filled account form, indicating that the chosen username already exists.
2. The use case resumes with step 2 of the basic flow.

Special Requirements

OCR must handle ten concurrent create account operations. Creating accounts should not take longer than 10 seconds.

Use-Case Specification: Delete Account

- Preconditions:
    - OCRUc View Account
- Postconditions:
    - Upon successful completion of a delete request, the account and all associated cars were marked "deleted" and User was logged out of the system.

Basic Flow

The use case begins when User wants to delete her/his account.

1. User submits the delete request.
2. OCR warns User that s/he is about to delete her/his account and that s/he will be logged out of the system.
3. User confirms the deletion of her/his account.
4. OCR marks the account as deleted. OCR also marks all cars associated with the selected account as deleted (in case of an Owner user).
5. OCR logs User out the system.
6. The use case terminates.

Special Requirements

OCR must handle ten concurrent delete account operations. Deleting an account should not take longer than 10 seconds.

Use-Case Specification: Delete Cars

- Preconditions:
  - OCRUc Owner View Cars
- Postconditions:
  - If successful, the selected car was marked as "deleted".
  - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when Owner wants to delete a car from the OCR system.

1. Owner selects one car to be deleted and submits the delete request.
2. OCR marks the car as "deleted".
3. OCR informs Owner that the car was deleted successfully.
4. The use case resumes with the base use case.

Alternate Flows

A1. No Car Selected

Occurs at step 2 of the basic flow if no car was selected.

1. OCR informs the actor that no car was selected.
2. The use case resumes with step 1 of the basic flow.

Special Requirements

OCR must handle five concurrent delete car operations. Deleting a car should not take longer than 10 seconds.

Use-Case Specification: Login

- Preconditions:
  - User (Customer or Owner) is at the OCR website.
- Postconditions:
  - If successful, User is logged in.
  - If not successful, User is not logged in and the actor was informed about the problem.

Basic Flow

The use case begins when when a User wants to log in.

1. OCR displays the login form, asking the User to enter her/his username and password.
2. User enters her/his username and password and submits the login request.
3. OCR logs User into the system.

Se utiliza el directorio Activo de la Empresa para realizar la Autenticación.

4. The use case terminates.

Alternate Flows

A1. Invalid Input

Occurs at step 3 of the basic flow if the username and password cannot be matched against the records of OCR or the account is marked "deleted".

1. OCR displays the login form, indicating that they do not match the records of OCR.
2. The use case terminates.

Special Requirements

OCR must handle ten concurrent login operations. Logging in should not take longer than 10 seconds.

Use-Case Specification: Logout

- Preconditions:
  - User (Customer or Owner) is logged in the OCR website.
- Postconditions:
  - User was logged out of the system.

Basic Flow

The use case begins when User wants to log out.

1. User submits the logout request.

2. OCR logs the user out of the system.
3. OCR informs User that s/he has been logged out of the system.
4. The use case terminates.

Special Requirements

OCR must handle ten concurrent logout operations. Logging out should not take longer than 10 seconds.

Use-Case Specification: Owner View Car

- Preconditions:
  - Owner is logged in the OCR website.
- Postconditions:
  - If successful, the car selected by the photographer was displayed.

Basic Flow

The use case begins when Owner wants to view information about her/his cars.

1. OCR retrieves all cars of the owner (cars marked as "deleted" are included).
2. OCR displays the following information for each car:
   - Filenames of the 5 photos
   - type of the car
   - license plate
   - location of the car
   - rent
   - deletion status ("Active" or "Inactive")
   - If there are more than 25 cars to be shown, the list is paginated and the actor is allowed to flip through the pages. The list may be sorted by rent.
3. Optionally, OCRUc Update Car or OCRUc Delete Car
4. The use case terminates.

Alternate Flows

A1. No Cars of Owner

Occurs at step 2 of the basic flow if the number of retrieved cars is zero.

1. OCR informs the actor that s/he has no cars in the OCR database.
2. The use case terminates.

Special Requirements

OCR must handle ten concurrent view cars operations. Viewing and sorting cars of a owner should not take longer than 10 seconds.

Use-Case Specification: Rent Car

- Preconditions:
  - OCRUc View Cars
- Postconditions:
  - If successful, the Financial Institution has received payment of a deposit (which will be deduced from the first month rent).
  - If successful, the Customer was allowed to download a lease for the rented car.
  - If not successful, the Customer was informed about the problem.

Basic Flow

The use case begins when Customer wants to rent a car.

1. Customer submits the initial application request.
2. OCR asks Customer to fill out the payment form:
   - email address (must contain one "@" character)
   - type of credit card (VISA, Mastercard)
   - credit card number (16 digits)
   - name of the primary card holder
   - month of the expiry date (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12)
   - year of the expiry date (greater than or equal to the current year)
3. Customer fills out the payment form in any order and submits the rent request.
4. OCR sends the application for rental request authorization to Financial Institution.
5. Financial Institution authorizes the payment.
6. OCR stores the rent record including the following information:
   - ID of Customer
   - email address
   - ID of the rented car
   - Rent of the car
   - Rental date time

7. The use case terminates.

Además, considere que para lo siguiente es importante tener registro:

- El valor total de la renta (VTR) se calcula como el valor que el dueño del carro estipula (VEI) inicialmente más las comisiones que aplican a cada carro: VTR = VEI + Suma Comisiones
  - Existe unos tipos de comisiones que deben aplicarse a todas las rentas
  - Los tipos de comisiones se aplican sobre el valor estipulado de renta (VEI) para el carro y son:
    - Gestión: 1%
    - Administración: 0.5%
    - Otros, etc….

- Para una renta aplican uno o varios impuestos
    - Los tipos de impuestos son:
        - Rete fuente (7%),
        - IVA (16%),
        - ICA (6%);
    - Los porcentajes se aplican sobre el total de la renta (VTR)
- Los usuarios registrados tienen descuentos.
    - Existen unos tipos de descuentos que se aplican a las rentas (ninguno o todos); cada descuento tiene un porcentaje de descuento que se aplica sobre el valor total de la renta
        - por membresía (0.5%),
        - descuento por renta frecuente (0.5%)
        - y otros, etc….

- El valor total a pagar (VTP) se calcula como: VTR + TI (total sumatoria) de impuestos) – TD (total sumatoria de descuentos).

- Los usuarios pueden realizar el pago del valor total a pagar de la renta (VTP) usando varios tipos de pago:

    - Efectivo: se requiere saber el monto entregado
    - con tarjeta de crédito: se debe guardar el número de autorización.
    - Bonos: se debe guardar valor del bono.

La suma de los valores de todos los medios de pago debe ser igual al valor total a pagar.

- Si durante la renta el carro falla, se debe tener un registro de varios carros que pueden ser entregados a cambio al cliente
    - Deben ser de las mismas características

- Además de tener el registro del cliente que renta el carro; se debe guardar el registro de todos los posibles conductores (el que lo renta puede ser uno de ellos); para cada conductor se debe almacenar la licencia de conducción y la identificación y el nombre.

Alternate Flows

A1. Missing Information

Occurs at step 4 of the basic flow if not all of the payment information was entered.

1. OCR displays the filled payment form, indicating which payment information was not entered.
2. The use case resumes with step 3 of the basic flow.

A2. Financial Transaction Declined

Occurs at step 5 of the basic flow if Financial Institution declines the credit card payment.

1. OCR informs the Customer that the payment was declined.
2. The use case terminates.

A3. The customer has applied for another car

Occurs at step 2 of the basic flow if the customer has an application on another car.

1. OCR informs Customer that he has an application on another car which has not been yet confirmed.
2. The use case terminates.

Special Requirements

OCR must be able handle five applications concurrently. Applying for a car should not take more than 120 seconds.

Use-Case Specification: Search Cars

- Preconditions:
  - Visitor is at the OCR website.
- Postconditions:
  - If successful, cars matching the actor's input were displayed.
  - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when the Customer wants to search for cars using different criteria.

1. OCR asks Customer to fill out the car search form.
   - optionally filled, locations (one or many from the list of available locations)
   - optionally filled, type of car
   - optionally filled, minimal and maximal desired rent
2. Customer fills out the car search form in any order and submits the search request.
3. OCRUc View Cars
4. The use case terminates.

Alternate Flows

No Search Criteria

Occurs at step 3 of the basic flow if none of the search criteria have been entered.

1. OCR displays the car search form, indicating that at least one search criteria must be entered.
2. The use case resumes with step 2 of the basic flow.

Special Requirements

OCR must handle ten concurrent car searches. Searching for cars should not take longer than 10 seconds.

Use-Case Specification: Update Car

- Preconditions:
  - OCRUc Owner View Cars
- Postconditions:
  - If successful, information about the selected car was updated.
  - If not successful, the actor was informed about the problem.

Basic Flow

The use case begins when Owner wants to update information about a car.

1. Owner selects one car to be updated and submits the initial update request.
2. OCR presents the prefilled car update form including the following information:
   - filenames of the five photos (cannot be changed)
   - type of the car (cannot be changed)
   - location (can not be changed)
   - rent
3. Owner changes the information in the car update form and submits the update request.
4. OCR updates the car information.
5. The use case resumes with the base use case.

Alternate Flows

A1. Missing Information

Occurs at step 4 of the basic flow if not all of the required car information was entered correctly.

1. OCR displays the filled car update form, indicating which car information was not entered correctly.
2. The use case resumes with step 3 of the basic flow.

A2. No Car Selected

Occurs at step 2 of the basic flow if no car was selected.

1. OCR informs the actor that no car was selected.
2. The use case resumes with step 1 of the basic flow.

Special Requirements

OCR must be able to handle ten concurrent update car operations. Updating cars should not take longer than 10 seconds.

Use-Case Specification: View Cars

- Preconditions:
  - OCRUc Browse Cars By Location or OCRUc Search Cars
- Postconditions:
  - If successful, the car selected by the actor was shown.
  - If not successful, the actor was informed about the problem.

Basic Flow

1. OCR retrieves all available cars that match the actor's input (cars marked as "deleted" or “NoValidated” are not considered).
2. OCR displays thumbnails of the requested photos including the following information for each photo:
   - description
   - date
   - country
   - If there are more than ten photos to be shown, the list is paginated and the actor is allowed to flip through the pages.

The list may be sorted by description, date, and country (default).

1. Visitor selects one car from the displayed list and submits the view request.
2. OCR retrieves the full but low-resolution image of the selected photo.
3. OCR displays the photo including the following information:
   - description
   - date
   - country
4. Optionally, OCRUc Rent Car
5. The use case terminates.

Alternate Flows

A1. No Matching Cars

Occurs at step 2 of the basic flow if the number of retrieved photos is zero.

1. OCR informs the actor that no cars match the given input.
2. The use case terminates.

Special Requirements

OCR must handle ten concurrent instances of displaying cars. Displaying and sorting cars should not take longer than 10 seconds.

Requerimientos de Consultas

Las siguientes son otras consultas que deberían ser posibles contestar con la base de datos:

1. Cantidad Total de carros rentados por cliente por períodos (mes, año)
2. Suma total pagada a los dueños por las rentas de sus carros (suma del valor de renta estipulado)
3. Suma total de comisiones que la empresa obtiene por las rentas, por períodos, por dueño.
4. Suma y cantidad de rentas por cliente, por período.
5. Número total de por país, departamento, municipio y ubicación (location)
6. Reporte de pagos por período, por entidad autorizadora.
7. Reporte por periodos (año, mes) de Impuestos que se deben pagar por cada renta.
8. ¿Cuáles son los carros más rentados?
9. ¿En qué departamento se rentan más carros?
10. ¿Cuáles son las carros más visitados por los visitantes?